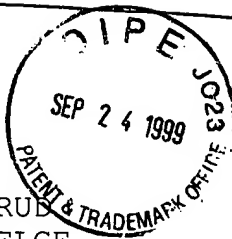


48
N23
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SEQUENCE LISTING



(1) GENERAL INFORMATION:

(i) APPLICANT: HOTTEN, GERTRUD
NEIDHARDT, HELGE
BECHTOLD, ROLF
POHL, JENS

Sub
C2

(ii) TITLE OF INVENTION: GROWTH/DIFFERENTIATION FACTORS OF THE TGF-B
FAMILY

(iii) NUMBER OF SEQUENCES: 53

(iv) CORRESPONDENCE ADDRESS:

(A) ADDRESSEE: NIKAIIDO, MARMELSTEIN, MURRAY & ORAM
(B) STREET: 655 FIFTEENTH STREET, N. W., G STREET LOBBY,
SUITE 330
(C) CITY: WASHINGTON
(D) STATE: DC
(E) COUNTRY: USA
(F) ZIP: 20005-5701

(v) COMPUTER READABLE FORM:

(A) MEDIUM TYPE: Floppy disk
(B) COMPUTER: IBM PC compatible
(C) OPERATING SYSTEM: PC-DOS/MS-DOS
(D) SOFTWARE: PatentIn Release #1.0, Version #1.25

(vi) CURRENT APPLICATION DATA:

(A) APPLICATION NUMBER: UNKNOWN
(B) FILING DATE: 25-AUG-1999
(C) CLASSIFICATION:

(vii) PRIOR APPLICATION DATA:

(A) APPLICATION NUMBER: US 08/289,222
(B) FILING DATE: 12-AUG-1994

(vii) PRIOR APPLICATION DATA:

(A) APPLICATION NUMBER: DE P 44 23 190.3
(B) FILING DATE: 07-JUL-1994

(vii) PRIOR APPLICATION DATA:

(A) APPLICATION NUMBER: EPO 92102324.8
(B) FILING DATE: 12-FEB-1992

(vii) PRIOR APPLICATION DATA:

0000155-09490

(A) APPLICATION NUMBER: PCT/EP93/00350
(B) FILING DATE: 12-FEB-1993

(viii) ATTORNEY/AGENT INFORMATION:

(A) NAME: KITTS, MONICA CHIN
(B) REGISTRATION NUMBER: 36,105
(C) REFERENCE/DOCKET NUMBER: P564-9021

(ix) TELECOMMUNICATION INFORMATION:

(A) TELEPHONE: 202/638-5000
(B) TELEFAX: 202/638-4810

(2) INFORMATION FOR SEQ ID NO:1:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 1207 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: both
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA or cDNA from mRNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

ACCGGGCGGC CCTGAACCCA AGCCAGGACA CCCTCCCCAA ACAAGGCAGG CTACAGCCCCG 60
GACTGTGACC CCAAAGGAC AGCTTCCCGG AGGCAAGGCA CCCCCAAAAG CAGGATCTGT 120
GCCAGCTCC TTCCTGCTGA AGAAGGCCAG GGAGCCCGGG CCCCCACGAG AGCCCAAGGA 180
GCCGTTTCGC CCACCCCCCA TCACACCCCA CGAGTACATG CTCTCGCTGT ACAGGACGCT 240
GTCCGATGCT GACAGAAAGG GAGGCAACAG CAGCGTGAAG TTGGAGGCTG GCCTGGCCAA 300
CACCATCACC AGCTTTATTG ACAAAGGGCA AGATGACCGA GGTCCCGTGG TCAGGAAGCA 360
GAGGTACGTG TTTGACATTA GTGCCCTGGA GAAGGATGGG CTGCTGGGGG CCGAGCTGCG 420
GATCTTGCGG AAGAAGCCCT CGGACACGGC CAAGCCAGCG GCCCCCGGAG GCGGGCGGGC 480
TGCCCAGCTG AAGCTGTCCA GCTGCCCCAG CGGCCGGCAG CCGGCCTCCT TGCTGGATGT 540
GCGCTCCGTG CCAGGCCTGG ACGGATCTGG CTGGGAGGTG TTCGACATCT GGAAGCTCTT 600

CCGAAACTTT AAGAACTCGG CCCAGCTGTG CCTGGAGCTG GAGGCCTGGG AACGGGGCAG 660
GGCCGTGGAC CTCCGTGGCC TGGGCTTCGA CCGCGCCGCC CGGCAGGTCC ACGAGAAGGC 720
CCTGTTCTTG GTGTTTGGCC GCACCAAGAA ACGGGACCTG TTCTTTAATG AGATTAAGGC 780
CCGCTCTGGC CAGGACGATA AGACCGTGTA TGAGTACCTG TTCAGCCAGC GGCAGAAAACG 840
GCGGGCCCCA CTGGCCACTC GCCAGGGCAA GCGACCCAGC AAGAACCTTA AGGCTCGCTG 900
CAGTCGGAAG GCACTGCATG TCAACTTCAA GGACATGGGC TGGGACGACT GGATCATCGC 960
ACCCCTTGAG TACGAGGCTT TCCACTGCGA GGGGCTGTGC GAGTTCCCAT TCGCTCCCA 1020
CCTGGAGCCC ACGAATCATG CAGTCATCCA GACCCTGATG AACTCCATGG ACCCCGAGTC 1080
CACACCACCC ACCTGCTGTG TGCCCACGCG GCTGAGTCCC ATCAGCATCC TCTTCATTGA 1140
CTCTGCCAAC AACGTGGTGT ATAAGCAGTA TGAGGACATG GTCGTGGAGT CGTGTGGCTG 1200
CAGGTAG 1207

090555-09499

(2) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 2272 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA from mRNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

CAAGGAGCCA TGCCAGCTGG ACACACACTT CTTCCAGGGC CTCTGGCAGC CAGGACAGAG 60
TTGAGACCAC AGCTGTTGAG ACCCTGAGCC CTGAGTCTGT ATTGCTCAAG AAGGGCCTTC 120
CCCAGCAATG ACCTCCTCAT TGCTTCTGGC CTTTCTCCTC CTGGCTCCAA CCACAGTGGC 180
CACTCCCAGA GCTGGCGGTC AGTGTCCAGC ATGTGGGGGG CCCACCTTGG AACTGGAGAG 240
CCAGCGGGAG CTGCTTCTTG ATCTGGCCAA GAGAAGCATC TTGGACAAGC TGCACCTCAC 300

CCAGCGCCCA	AACTGAACC	GCCCTGTGTC	CAGAGCTGCT	TTGAGGACTG	CACTGCAGCA	360
CCTCCACGGG	GTCCCACAGG	GGGCACTTCT	AGAGGACAAC	AGGGAACAGG	AATGTGAAAT	420
CATCAGCTTT	GCTGAGACAG	GCCTCTCCAC	CATCAACCAG	ACTCGTCTTG	ATTTTCACTT	480
CTCCTCTGAT	AGAACTGCTG	GTGACAGGGA	GGTCCAGCAG	GCCAGTCTCA	TGTTCTTTGT	540
GCAGCTCCCT	TCCAATACCA	CTTGGACCTT	GAAAGTGAGA	GTCCTTGTGC	TGGGTCCACA	600
TAATACCAAC	CTCACCTTGG	CTACTCAGTA	CCTGCTGGAG	GTGGATGCCA	GTGGCTGGCA	660
TCAACTCCCC	CTAGGGCCTG	AAGCTCAAGC	TGCCTGCAGC	CAGGGGCACC	TGACCCTGGA	720
GCTGGTACTT	GAAGGCCAGG	TAGCCCAGAG	CTCAGTCATC	CTGGGTGGAG	CTGCCCATAG	780
GCCTTTTGTG	GCAGCCCGGG	TGAGAGTTGG	GGGCAAACAC	CAGATTCACC	GACGAGGCAT	840
CGACTGCCAA	GGAGGGTCCA	GGATGTGCTG	TCGACAAGAG	TTTTTTGTGG	ACTTCCGTGA	900
GATTGGCTGG	CACGACTGGA	TCATCCAGCC	TGAGGGCTAC	GCCATGAACT	TCTGCATAGG	960
GCAGTGCCCA	CTACACATAG	CAGGCATGCC	TGGTATTGCT	GCCTCCTTTC	AACTGCAGT	1020
GTCAATCTT	CTCAAGGCCA	ACACAGCTGC	AGGCACCACT	GGAGGGGGCT	CATGCTGTGT	1080
ATCCACGGCC	CGGCGCCCCC	TGTCTCTGCT	CTATTATGAC	AGGGACAGCA	ACATTGTCAA	1140
GACTGACATA	CCTGACATGG	TAGTAGAGGC	CTGTGGGTGC	AGTTAGTCTA	TGTGTGGTAT	1200
GGCAGCCCA	AGGTTGCATG	GGAAAACACG	CCCCTACAGA	AGTGCACTTC	CTTGAGAGGA	1260
GGGAATGACC	TCATTCTCTG	TCCAGAATGT	GGACTCCCTC	TTCCTGAGCA	TCTTATGGAA	1320
ATTACCCAC	CTTTGACTTG	AAGAAACCTT	CATCTAAAGC	AAGTCACTGT	GCCATCTTCC	1380
TGACCACTAC	CCTCTTTCCT	AGGGCATAGT	CCATCCCGCT	AGTCCATCCC	GCTAGCCCCA	1440
CTCCAGGGAC	TCAGACCCAT	CTCCAACCAT	GAGCAATGCC	ATCTGGTTCC	CAGGCAAAGA	1500
CACCCTTAGC	TCACCTTTAA	TAGACCCCAT	AACCCACTAT	GCCTTCCTGT	CCTTTCTACT	1560
CAATGGTCCC	CACTCCAAGA	TGAGTTGACA	CAACCCCTTC	CCCCAATTTT	TGTGGATCTC	1620
CAGAGAGGCC	CTTCTTTGGA	TTCACCAAAG	TTTAGATCAC	TGCTGCCCAA	AATAGAGGCT	1680
TACCTACCCC	CCTCTTTGTT	GTGAGCCCCT	GTCCTTCTTA	GTTGTCCAGG	TGAACTACTA	1740

AAGCTCTCTT TGCATACCTT CATCCATTTT TTGTCCTTCT CTGCCTTTCT CTATGCCCTT 1800
 AAGGGGTGAC TTGCCTGAGC TCTATCACCT GAGCTCCCCT GCCCTCTGGC TTCCTGCTGA 1860
 GGTCAGGGCA TTTCTTATCC CTGTTCCCTC TCTGTCTAGG TGTCATGGTT CTGTGTAAC 1920
 GTGGCTATTC TGTGTCCCTA CACTACCTGG CTACCCCCTT CCATGGCCCC AGCTCTGCCT 1980
 ACATTCTGAT TTTTTTTTTT TTTTTTTTTT TGAAAAGTTA AAAATTCCTT AATTTTTTAT 2040
 TCCTGGTACC ACTACCACAA TTTACAGGGC AATATACCTG ATGTAATGAA AAGAAAAAGA 2100
 AAAAGACAAA GCTACAACAG ATAAAAGACC TCAGGAATGT ACATCTAATT GACACTACAT 2160
 TGCATTAATC AATAGCTGCA CTTTTTGCAA ACTGTGGCTA TGACAGTCCT GAACAAGAAG 2220
 GGTTTCCTGT TTAAGCTGCA GTAACTTTTC TGACTATGGA TCATCGTTCC TT 2272

(2) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 401 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

Pro	Gly	Gly	Pro	Glu	Pro	Lys	Pro	Gly	His	Pro	Pro	Gln	Thr	Arg	Gln
1				5					10					15	
Ala	Thr	Ala	Arg	Thr	Val	Thr	Pro	Lys	Gly	Gln	Leu	Pro	Gly	Gly	Lys
			20					25					30		
Ala	Pro	Pro	Lys	Ala	Gly	Ser	Val	Pro	Ser	Ser	Phe	Leu	Leu	Lys	Lys
			35				40					45			
Ala	Arg	Glu	Pro	Gly	Pro	Pro	Arg	Glu	Pro	Lys	Glu	Pro	Phe	Arg	Pro
	50					55					60				
Pro	Pro	Ile	Thr	Pro	His	Glu	Tyr	Met	Leu	Ser	Leu	Tyr	Arg	Thr	Leu
65					70					75					80

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Ser	Asp	Ala	Asp	Arg	Lys	Gly	Gly	Asn	Ser	Ser	Val	Lys	Leu	Glu	Ala	
				85					90					95		
Gly	Leu	Ala	Asn	Thr	Ile	Thr	Ser	Phe	Ile	Asp	Lys	Gly	Gln	Asp	Asp	
			100					105					110			
Arg	Gly	Pro	Val	Val	Arg	Lys	Gln	Arg	Tyr	Val	Phe	Asp	Ile	Ser	Ala	
		115					120					125				
Leu	Glu	Lys	Asp	Gly	Leu	Leu	Gly	Ala	Glu	Leu	Arg	Ile	Leu	Arg	Lys	
	130					135					140					
Lys	Pro	Ser	Asp	Thr	Ala	Lys	Pro	Ala	Ala	Pro	Gly	Gly	Gly	Arg	Ala	
145					150					155				160		
Ala	Gln	Leu	Lys	Leu	Ser	Ser	Cys	Pro	Ser	Gly	Arg	Gln	Pro	Ala	Ser	
				165					170					175		
Leu	Leu	Asp	Val	Arg	Ser	Val	Pro	Gly	Leu	Asp	Gly	Ser	Gly	Trp	Glu	
			180					185					190			
Val	Phe	Asp	Ile	Trp	Lys	Leu	Phe	Arg	Asn	Phe	Lys	Asn	Ser	Ala	Gln	
		195					200					205				
Leu	Cys	Leu	Glu	Leu	Glu	Ala	Trp	Glu	Arg	Gly	Arg	Ala	Val	Asp	Leu	
	210					215					220					
Arg	Gly	Leu	Gly	Phe	Asp	Arg	Ala	Ala	Arg	Gln	Val	His	Glu	Lys	Ala	
225					230					235				240		
Leu	Phe	Leu	Val	Phe	Gly	Arg	Thr	Lys	Lys	Arg	Asp	Leu	Phe	Phe	Asn	
				245					250					255		
Glu	Ile	Lys	Ala	Arg	Ser	Gly	Gln	Asp	Asp	Lys	Thr	Val	Tyr	Glu	Tyr	
			260					265					270			
Leu	Phe	Ser	Gln	Arg	Arg	Lys	Arg	Arg	Ala	Pro	Leu	Ala	Thr	Arg	Gln	
		275					280					285				
Gly	Lys	Arg	Pro	Ser	Lys	Asn	Leu	Lys	Ala	Arg	Cys	Ser	Arg	Lys	Ala	
	290					295					300					
Leu	His	Val	Asn	Phe	Lys	Asp	Met	Gly	Trp	Asp	Asp	Trp	Ile	Ile	Ala	
305					310					315					320	
Pro	Leu	Glu	Tyr	Glu	Ala	Phe	His	Cys	Glu	Gly	Leu	Cys	Glu	Phe	Pro	
				325					330					335		

Leu Arg Ser His Leu Glu Pro Thr Asn His Ala Val Ile Gln Thr Leu
 340 345 350
 Met Asn Ser Met Asp Pro Glu Ser Thr Pro Pro Thr Cys Cys Val Pro
 355 360 365
 Thr Arg Leu Ser Pro Ile Ser Ile Leu Phe Ile Asp Ser Ala Asn Asn
 370 375 380
 Val Val Tyr Lys Gln Tyr Glu Asp Met Val Val Glu Ser Cys Gly Cys
 385 390 395 400
 Arg

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 352 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

Met Thr Ser Ser Leu Leu Leu Ala Phe Leu Leu Leu Ala Pro Thr Thr
 1 5 10 15
 Val Ala Thr Pro Arg Ala Gly Gly Gln Cys Pro Ala Cys Gly Gly Pro
 20 25 30
 Thr Leu Glu Leu Glu Ser Gln Arg Glu Leu Leu Leu Asp Leu Ala Lys
 35 40 45
 Arg Ser Ile Leu Asp Lys Leu His Leu Thr Gln Arg Pro Thr Leu Asn
 50 55 60
 Arg Pro Val Ser Arg Ala Ala Leu Arg Thr Ala Leu Gln His Leu His
 65 70 75 80
 Gly Val Pro Gln Gly Ala Leu Leu Glu Asp Asn Arg Glu Gln Glu Cys
 85 90 95

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Glu	Ile	Ile	Ser	Phe	Ala	Glu	Thr	Gly	Leu	Ser	Thr	Ile	Asn	Gln	Thr
			100					105					110		
Arg	Leu	Asp	Phe	His	Phe	Ser	Ser	Asp	Arg	Thr	Ala	Gly	Asp	Arg	Glu
		115					120					125			
Val	Gln	Gln	Ala	Ser	Leu	Met	Phe	Phe	Val	Gln	Leu	Pro	Ser	Asn	Thr
	130					135					140				
Thr	Trp	Thr	Leu	Lys	Val	Arg	Val	Leu	Val	Leu	Gly	Pro	His	Asn	Thr
145					150					155					160
Asn	Leu	Thr	Leu	Ala	Thr	Gln	Tyr	Leu	Leu	Glu	Val	Asp	Ala	Ser	Gly
				165					170					175	
Trp	His	Gln	Leu	Pro	Leu	Gly	Pro	Glu	Ala	Gln	Ala	Ala	Cys	Ser	Gln
			180					185					190		
Gly	His	Leu	Thr	Leu	Glu	Leu	Val	Leu	Glu	Gly	Gln	Val	Ala	Gln	Ser
		195					200					205			
Ser	Val	Ile	Leu	Gly	Gly	Ala	Ala	His	Arg	Pro	Phe	Val	Ala	Ala	Arg
	210					215					220				
Val	Arg	Val	Gly	Gly	Lys	His	Gln	Ile	His	Arg	Arg	Gly	Ile	Asp	Cys
225					230					235				240	
Gln	Gly	Gly	Ser	Arg	Met	Cys	Cys	Arg	Gln	Glu	Phe	Phe	Val	Asp	Phe
				245					250					255	
Arg	Glu	Ile	Gly	Trp	His	Asp	Trp	Ile	Ile	Gln	Pro	Glu	Gly	Tyr	Ala
			260					265					270		
Met	Asn	Phe	Cys	Ile	Gly	Gln	Cys	Pro	Leu	His	Ile	Ala	Gly	Met	Pro
		275					280					285			
Gly	Ile	Ala	Ala	Ser	Phe	His	Thr	Ala	Val	Leu	Asn	Leu	Leu	Lys	Ala
	290					295					300				
Asn	Thr	Ala	Ala	Gly	Thr	Thr	Gly	Gly	Gly	Ser	Cys	Cys	Val	Pro	Thr
305					310					315				320	
Ala	Arg	Arg	Pro	Leu	Ser	Leu	Leu	Tyr	Tyr	Asp	Arg	Asp	Ser	Asn	Ile
				325					330					335	
Val	Lys	Thr	Asp	Ile	Pro	Asp	Met	Val	Val	Glu	Ala	Cys	Gly	Cys	Ser
			340					345					350		

(2) INFORMATION FOR SEQ ID NO:5:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 265 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA from mRNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

CATCCAGCCT GAGGGCTACG CCATGAACTT CTGCATAGGG CAGTGCCCAC TACACATAGC 60
AGGCATGCCT GGTATTGCTG CCTCCTTTCA CACTGCAGTG CTCAATCTTC TCAAGGCCAA 120
CAGCTGCA GGCACCACTG GAGGGGGCTC ATGCTGTGTA CCCACGGCCC GGCGCCCCCT 180
GCTCTGCTC TATTATGACA GGGACAGCAA CATTGTCAAG ACTGACATAC CTGACATGGT 240
AGTAGAGGCC TGTGGGTGCA GTTAG 265

(2) INFORMATION FOR SEQ ID NO:6:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 139 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA from mRNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

CATCGCACCC CTTGAGTACG AGGCTTTCCA CTGCGAGGGG CTGTGCGAGT TCCCATTGCG 60
CTCCACCTG GAGCCACGA ATCATGCAGT CATCCAGACC CTGATGAACT CCATGGACCC 120
CGAGTCCACA CCACCCACC 139

(2) INFORMATION FOR SEQ ID NO:7:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 27 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

ATGAACTCCA TGGACCCCGA GTCCACA

27

(2) INFORMATION FOR SEQ ID NO:8:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 30 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

GTCTCAAGG CCAACACAGC TGCAGGCACC

30

(2) INFORMATION FOR SEQ ID NO:9:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

Met Asn Ser Met Asp Pro Glu Ser Thr
1 5

(2) INFORMATION FOR SEQ ID NO:10:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

Leu Leu Lys Ala Asn Thr Ala Ala Gly Thr
1 5 10

(2) INFORMATION FOR SEQ ID NO:11:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 46 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

AGAATTCGCA TGCCATGGTC GACGAAGCTT TTTTTTTTTT TTTTTT

46

(2) INFORMATION FOR SEQ ID NO:12:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 24 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

AGAATTCGCA TGCCATGGTC GACG

24

(2) INFORMATION FOR SEQ ID NO:13:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 24 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

GCTACGCCA TGAATTCTG CATA

24

(2) INFORMATION FOR SEQ ID NO:14:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 24 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

ACATAGCAGG CATGCCTGGT ATTG

24

(2) INFORMATION FOR SEQ ID NO:15:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 23 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

CTTGAGTACG AGGCTTTCCA CTG

23

(2) INFORMATION FOR SEQ ID NO:16:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 24 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

ATTGCGATGC CATGGTCGAC GAAG

24

(2) INFORMATION FOR SEQ ID NO:17:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 23 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

GGAGCCCACG AATCATGCAG TCA

23

(2) INFORMATION FOR SEQ ID NO:18:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 23 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: both

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

ACAGCAGGTG GGTGGTGTGG ACT

23

(2) INFORMATION FOR SEQ ID NO:19:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 20 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: both

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

CCAGCAGCCC ATCCTTCTCC

20

(2) INFORMATION FOR SEQ ID NO:20:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 24 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: both

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:20:

TCCAGGGCAC TAATGTCAAA CACG

24

(2) INFORMATION FOR SEQ ID NO:21:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 24 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:21:

ACTAATGTCA AACACGTACC TCTG

24

(2) INFORMATION FOR SEQ ID NO:22:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 102 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS:
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:22:

Cys Ser Arg Lys Ala Leu His Val Asn Phe Lys Asp Met Gly Trp Asp
1 5 10 15
Asp Trp Ile Ile Ala Pro Leu Glu Tyr Glu Ala Phe His Cys Glu Gly
20 25 30
Leu Cys Glu Phe Pro Leu Arg Ser His Leu Glu Pro Thr Asn His Ala
35 40 45
Val Ile Gln Thr Leu Met Asn Ser Met Asp Pro Glu Ser Thr Pro Pro
50 55 60
Thr Cys Cys Val Pro Thr Arg Leu Ser Pro Ile Ser Ile Leu Phe Ile
65 70 75 80
Asp Ser Ala Asn Asn Val Val Tyr Lys Gln Tyr Glu Asp Met Val Val
85 90 95
Glu Ser Cys Gly Cys Arg
100

(2) INFORMATION FOR SEQ ID NO:23:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 101 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS:
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:23:

Cys Lys Arg His Pro Leu Tyr Val Asp Phe Ser Asp Val Gly Trp Asn
1 5 10 15
Asp Trp Ile Val Ala Pro Pro Gly Tyr His Ala Phe Tyr Cys His Gly
20 25 30
Glu Cys Pro Phe Pro Leu Ala Asp His Leu Asn Ser Thr Asn His Ala
35 40 45
Ile Val Gln Thr Leu Val Asn Ser Val Asn Ser Lys Ile Pro Lys Ala
50 55 60
Cys Cys Val Pro Thr Glu Leu Ser Ala Ile Ser Met Leu Tyr Leu Asp
65 70 75 80
Glu Asn Glu Lys Val Val Leu Lys Asn Tyr Gln Asp Met Val Val Glu
85 90 95
Gly Cys Gly Cys Arg
100

(2) INFORMATION FOR SEQ ID NO:24:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 101 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS:
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:24:

Cys Arg Arg His Ser Leu Tyr Val Asp Phe Ser Asp Val Gly Trp Asn

1 5 10 15

Asp Trp Ile Val Ala Pro Pro Gly Tyr Gln Ala Phe Tyr Cys His Gly
20 25 30

Asp Cys Pro Phe Pro Leu Ala Asp His Leu Asn Ser Thr Asn His Ala
35 40 45

Ile Val Gln Thr Leu Val Asn Ser Val Asn Ser Ser Ile Pro Lys Ala
50 55 60

Cys Cys Val Pro Thr Glu Leu Ser Ala Ile Ser Met Leu Tyr Leu Asp
65 70 75 80

Glu Tyr Asp Lys Val Val Leu Lys Asn Tyr Gln Glu Met Val Val Glu
85 90 95

Gly Cys Gly Cys Arg
100

INFORMATION FOR SEQ ID NO:25:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 102 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS:
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:25:

Cys Lys Lys His Glu Leu Tyr Val Ser Phe Arg Asp Leu Gly Trp Gln
1 5 10 15

Asp Trp Ile Ile Ala Pro Glu Gly Tyr Ala Ala Phe Tyr Cys Asp Gly
20 25 30

Glu Cys Ser Phe Pro Leu Asn Ala His Met Asn Ala Thr Asn His Ala
35 40 45

Ile Val Gln Thr Leu Val His Leu Met Phe Pro Asp His Val Pro Lys
50 55 60

Pro Cys Cys Ala Pro Thr Lys Leu Asn Ala Ile Ser Val Leu Tyr Phe
65 70 75 80

Asp Asp Ser Ser Asn Val Ile Leu Lys Lys Tyr Arg Asn Met Val Val
85 90 95

Arg Ser Cys Gly Cys His
100

(2) INFORMATION FOR SEQ ID NO:26:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 102 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS:
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:26:

Cys Arg Lys His Glu Leu Tyr Val Ser Phe Gln Asp Leu Gly Trp Gln
1 5 10 15

Asp Trp Ile Ile Ala Pro Lys Gly Tyr Ala Ala Asn Tyr Cys Asp Gly
20 25 30

Glu Cys Ser Phe Pro Leu Asn Ala His Met Asn Ala Thr Asn His Ala
35 40 45

Ile Val Gln Thr Leu Val His Leu Met Asn Pro Glu Tyr Val Pro Lys
50 55 60

Pro Cys Cys Ala Pro Thr Lys Leu Asn Ala Ile Ser Val Leu Tyr Phe
65 70 75 80

Asp Asp Asn Ser Asn Val Ile Leu Lys Lys Tyr Arg Asn Met Val Val
85 90 95

Arg Ala Cys Gly Cys His
100

(2) INFORMATION FOR SEQ ID NO:27:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 102 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS:
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:27:

Cys Lys Lys His Glu Leu Tyr Val Ser Phe Arg Asp Leu Gly Trp Gln
1 5 10 15
Asp Trp Ile Ile Ala Pro Glu Gly Tyr Ala Ala Tyr Tyr Cys Glu Gly
20 25 30
Glu Cys Ala Phe Pro Leu Asn Ser Tyr Met Asn Ala Thr Asn His Ala
35 40 45
Ile Val Gln Thr Leu Val His Phe Ile Asn Pro Glu Thr Val Pro Lys
50 55 60
Pro Cys Cys Ala Pro Thr Gln Leu Asn Ala Ile Ser Val Leu Tyr Phe
65 70 75 80
Asp Asp Ser Ser Asn Val Ile Leu Lys Lys Tyr Arg Asn Met Val Val
85 90 95
Arg Ala Cys Gly Cys His
100

INFORMATION FOR SEQ ID NO:28:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 106 amino acids
(B) TYPE: amino acid
(C) STRANDEDNESS:
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:28:

Cys Cys Arg Gln Glu Phe Phe Val Asp Phe Arg Glu Ile Gly Trp His
1 5 10 15
Asp Trp Ile Ile Gln Pro Glu Gly Tyr Ala Met Asn Phe Cys Ile Gly
20 25 30
Gln Cys Pro Leu His Ile Ala Gly Met Pro Gly Ile Ala Ala Ser Phe
35 40 45

His Thr Ala Val Leu Asn Leu Leu Lys Ala Asn Thr Ala Ala Gly Thr
 50 55 60
 Thr Gly Gly Gly Ser Cys Cys Val Pro Thr Ala Arg Arg Pro Leu Ser
 65 70 75 80
 Leu Leu Tyr Tyr Asp Arg Asp Ser Asn Ile Val Lys Thr Asp Ile Pro
 85 90 95
 Asp Met Val Val Glu Ala Cys Gly Cys Ser
 100 105

(2) INFORMATION FOR SEQ ID NO:29:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 106 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS:
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:29:

Cys Cys Lys Lys Gln Phe Phe Val Ser Phe Lys Asp Ile Gly Trp Asn
 1 5 10 15
 Asp Trp Ile Ile Ala Pro Ser Gly Tyr His Ala Asn Tyr Cys Glu Gly
 20 25 30
 Glu Cys Pro Ser His Ile Ala Gly Thr Ser Gly Ser Ser Leu Ser Phe
 35 40 45
 His Ser Thr Val Ile Asn His Tyr Arg Met Arg Gly His Ser Pro Phe
 50 55 60
 Ala Asn Leu Lys Ser Cys Cys Val Pro Thr Lys Leu Arg Pro Met Ser
 65 70 75 80
 Met Leu Tyr Tyr Asp Asp Gly Gln Asn Ile Ile Lys Lys Asp Ile Gln
 85 90 95
 Asn Met Ile Val Glu Glu Cys Gly Cys Ser
 100 105

(2) INFORMATION FOR SEQ ID NO:30:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 105 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS:
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:30:

Cys	Cys	Arg	Gln	Gln	Phe	Phe	Ile	Asp	Phe	Arg	Leu	Ile	Gly	Trp	Asn
1				5					10					15	
Asp	Trp	Ile	Ile	Ala	Pro	Thr	Gly	Tyr	Tyr	Gly	Asn	Tyr	Cys	Glu	Gly
			20					25					30		
Ser	Cys	Pro	Ala	Tyr	Leu	Ala	Gly	Val	Pro	Gly	Ser	Ala	Ser	Ser	Phe
		35					40					45			
His	Thr	Ala	Val	Val	Asn	Gln	Tyr	Arg	Met	Arg	Gly	Leu	Asn	Pro	Gly
						55					60				
Thr	Val	Asn	Ser	Cys	Cys	Ile	Pro	Thr	Lys	Leu	Ser	Thr	Met	Ser	Met
65					70					75					80
Leu	Tyr	Phe	Asp	Asp	Glu	Tyr	Asn	Ile	Val	Lys	Arg	Asp	Val	Pro	Asn
				85					90					95	
Met	Ile	Val	Glu	Glu	Cys	Gly	Cys	Ala							
			100					105							

(xii) INFORMATION FOR SEQ ID NO:31:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 105 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS:
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:31:

Cys	His	Arg	Val	Ala	Leu	Asn	Ile	Ser	Phe	Gln	Glu	Leu	Gly	Trp	Glu
1				5					10					15	

Arg	Trp	Ile	Val	Tyr	Pro	Pro	Ser	Phe	Ile	Phe	His	Tyr	Cys	His	Gly
			20					25					30		
Gly	Cys	Gly	Leu	His	Ile	Pro	Pro	Asn	Leu	Ser	Leu	Pro	Val	Pro	Gly
		35					40					45			
Ala	Pro	Pro	Thr	Pro	Ala	Gln	Pro	Tyr	Ser	Leu	Leu	Pro	Gly	Ala	Gln
	50					55					60				
Pro	Cys	Cys	Ala	Ala	Leu	Pro	Gly	Thr	Met	Arg	Pro	Leu	His	Val	Arg
65					70					75					80
Thr	Thr	Ser	Asp	Gly	Gly	Tyr	Ser	Phe	Lys	Tyr	Glu	Thr	Val	Pro	Asn
				85					90					95	
Leu	Leu	Thr	Gln	His	Cys	Ala	Cys	Ile							
			100					105							

(2) INFORMATION FOR SEQ ID NO:32:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 36 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:32:

ATGAATTCCC ATGGACCTGG GCTGGMAKGA MTGGAT

36

(2) INFORMATION FOR SEQ ID NO:33:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 22 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:33:

ACGTGGGGTG GAATGACTGG AT

22

(2) INFORMATION FOR SEQ ID NO:34:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 22 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:34:

ATATTGGCTG GAGTGAATGG AT

22

(2) INFORMATION FOR SEQ ID NO:35:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 22 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:35:

ATGTGGGCTG GAATGACTGG AT

22

(2) INFORMATION FOR SEQ ID NO:36:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 22 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:36:

ACCTGGGCTG GCAGGACTGG AT

22

(2) INFORMATION FOR SEQ ID NO:37:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 22 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:37:

AGGACCTCGG CTGGAAGTGG AT

22

(2) INFORMATION FOR SEQ ID NO:38:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 22 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:38:

GGATCTAGG GTGGAAATGG AT

22

(2) INFORMATION FOR SEQ ID NO:39:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 22 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:39:

AGGATCTGGG CTGGAAGTGG GT

22

(2) INFORMATION FOR SEQ ID NO:40:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 22 base pairs
 (B) TYPE: nucleic acid

(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:40:

AGCTGGGCTG GGAACGGTGG AT

22

(2) INFORMATION FOR SEQ ID NO:41:

(i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 22 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:41:

ACATCGGCTG GAATGACTGG AT

22

(2) INFORMATION FOR SEQ ID NO:42:

(i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 22 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:42:

TCATCGGCTG GAACGACTGG AT

22

(2) INFORMATION FOR SEQ ID NO:43:

(i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 29 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:43:

ATGAATTCGA GCTGCGTSGG SRCACAGCA

29

(2) INFORMATION FOR SEQ ID NO:44:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 21 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:44:

GAGTTCTGTC GGGACACAGC A

21

(2) INFORMATION FOR SEQ ID NO:45:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 21 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:45:

CATCTTTTCT GGTACACAGC A

21

(2) INFORMATION FOR SEQ ID NO:46:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 21 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:46:

CAGTTCAGTG GGCACACAAC A

21

(2) INFORMATION FOR SEQ ID NO:47:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 21 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:47:

GAGCTGCGTG GGCGCACAGC A

21

(2) INFORMATION FOR SEQ ID NO:48:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 21 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:48:

CAGCGCCTGC GGCACGCAGC A

21

(2) INFORMATION FOR SEQ ID NO:49:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 21 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:49:

TAAATCTTGG GACACGCAGC A

21

(2) INFORMATION FOR SEQ ID NO:50:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 21 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:50:

CAGGTCCTGG GGCACGCAGC A

21

(2) INFORMATION FOR SEQ ID NO:51:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 21 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:51:

GGCTGGGAGA GCAGCACAGC A

21

(2) INFORMATION FOR SEQ ID NO:52:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 21 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:52:

CAGCTTGGTG GGCACACAGC A

21

(2) INFORMATION FOR SEQ ID NO:53:

- (i) SEQUENCE CHARACTERISTICS:

55